

must have been across the Brahmaputra Valley than over the great plain of the Ganges. This difference alone would give the Transgangetic fauna of Burma an advantage over the Cisgangetic fauna in a race for the vacant Himalayas, even if the latter had not been driven farther to the southward than the former, as it probably was during the Glacial epoch.

The theory, however, is only put forward as a possible explanation of some remarkable features in the distribution of Indian vertebrates. At the same time it does serve to account for several anomalies of which some solution is necessary. If thus accepted, it will add to the evidence, now considerable, in favour of the Glacial epoch having affected the whole world, and not having been a partial phenomenon induced by special conditions, such as local elevation.

SCIENCE TEACHERS IN CONFERENCE.

FOR the third time the Technical Education Board of the London County Council has arranged and held a conference of teachers of science from all parts of the kingdom. Since their inauguration, these annual meetings have steadily grown in popularity. At the first conference, in 1899, there was an attendance of eighty persons, in 1900 the number had grown to 200, while at the meetings held last week the attendance reached the total of 350. These satisfactory results are largely due to the efforts of Mr. C. A. Buckmaster, of the Board of Education, and Dr. Kimmins, the Inspector to the Technical Education Board, who have steadily worked during the three years in encouraging lecturers, demonstrators and inspectors to meet together for the discussion of methods of teaching different branches of science. The addresses and papers brought before the conference at the South-Western Polytechnic, Chelsea, on January 10 and 11, dealt with subjects of great importance in an interesting and instructive manner; but the discussions were not entirely satisfactory. It is useless to expect teachers to contribute anything valuable to a discussion at a moment's notice. It should be possible at future meetings to obviate in a large measure the desultory speeches on more or less general topics which this year followed the addresses and papers. If half a dozen well-known, practical teachers were given an abstract of the paper before the meeting, they would be able, with a few days' preparation, to place succinctly before the meeting the results of their own practice, and besides putting the discussion on right lines, they would lead other teachers with experience of the matter in hand to help forward a complete presentation of the subject.

One more preliminary remark is necessary. Too much was attempted at separate meetings, at some of which as many as three papers were read and put down to be discussed in two hours. The consequences were unfortunate. To name one instance only: at the third meeting, not only was Prof. Armstrong unable to deliver the whole of the paper he had prepared on the teaching of domestic science, but though the discussion was continued some fifteen minutes after the proper time, he was not called upon to reply to the points raised by different speakers. It is to be hoped that next year fewer subjects will be taken up at each meeting, and more pains taken to secure an ample discussion, rigidly kept to the matter in hand.

INSTRUMENT MAKING.

At the first meeting of the conference, Mr. T. A. Organ, the Chairman of the Technical Education Committee of the London County Council, presided. In his introductory remarks the Chairman insisted on the need there is still for improved science teaching in our schools, and directed attention to a growing danger of doing too much for students. What has been called in America "peptonised" education seems to be on the increase, and is much to be deprecated. Addresses were given on "Instrument-making for schools and technical classes," by Mr. W. Hibbert, of Regent Street Polytechnic; and on the "Co-ordination of workshop and laboratory instruction," by Mr. T. P. Nunn, of William Ellis's School, and Mr. A. G. Hubbard, of Raine's School. During the course of his remarks, Mr. Hibbert described, with the aid of lantern slides, a large number of simple pieces of apparatus for use in the teaching of electricity and magnetism, amongst which his magnetometer, which can be easily converted into an astatic galvanometer, his electroscope, capable of detecting one-tenth the potential difference recognisable by the ordinary forms of

instrument, and his standard magnets are particularly worth mention. The remaining addresses described successful attempts to make the work of the manual instruction teacher assist the practical study of physics. In the subsequent discussion, Dr. Gladstone, F.R.S., referred to the efforts he had made on the London School Board in the direction of supplying the teachers of the schools of the Board with simple, inexpensive apparatus which would satisfactorily demonstrate the elementary principles of physics and chemistry.

THE FITTING UP OF LABORATORIES.

Sir W. de W. Abney, K.C.B., F.R.S., took the chair at the second meeting, and lectures were given by Messrs. J. B. Coleman, A. Schwartz and W. W. Pullen, describing the fittings and apparatus of the chemical, physical and mechanical laboratories, of which they respectively have charge at the South-Western Polytechnic. After the addresses, which were profusely illustrated with lantern slides, a discussion was opened by Prof. Armstrong, F.R.S. Referring to the provision which Mr. Coleman has made for the proper writing of notes in the laboratory itself at the time the practical exercise in science is actually performed, Prof. Armstrong urged that one of the most valuable results from intelligent science teaching is the excellent progress the pupil makes in his ability to express himself in a literary manner when called upon to systematically describe the work he has performed. He also urged that it is a great mistake to suppose that palatial establishments, such as those described by the lecturers, are really necessary for teaching science to boys and girls. Pretentious "drawing-room" laboratories are by no means desirable; what is wanted is not so much a laboratory as a workshop, which need be little more than a shed, such as a contractor about to put up a large building erects for the use of his workmen. Students who work in the sumptuously-fitted places now provided are not suitably trained for the work of life; nobody in commercial undertakings gets a place anything like as good as a school laboratory in which to do his professional work. The thing of importance is the spirit with which the work is undertaken, not the number of appliances at the disposal of the teacher and pupil.

In acknowledging a vote of thanks, and at the same time summarising the papers and discussion, Sir W. Abney explained that his experience in connection with the Board of Education at South Kensington has shown him what a great deal can be done with very simple apparatus. He had, he said, again and again met, in different parts of the country, teachers using the simple pieces of physical apparatus they had made in the laboratories of the Royal College of Science during the courses of instruction arranged for them there during the summer vacation. The teacher of science who has learnt how to make and devise these simple pieces of apparatus can, with the aid of his pupils, easily turn out apparatus quite suitable for satisfactorily demonstrating the important laws of chemical and physical science.

DOMESTIC SCIENCE.

The third meeting, over which Mr. Bousfield, Chairman of the Girls' Public Day School, presided, was devoted to a consideration of the science teaching in girls' schools, especially as to what form of instruction in domestic science is desirable. The first paper was read by Miss Aitken, of the North London Collegiate School, who gave it as her opinion that the best practical teaching in science for girls is given in the now well-known schools of science held in connection with the South Kensington branch of the Board of Education. The generality of girls' schools are not, Miss Aitken finds, properly provided with necessary and suitable accommodation for the pupils to themselves make experiments with simple apparatus, the classes in science are too large, and the amount of time placed at the disposal of the science mistress is ludicrously inadequate.

Prof. Armstrong, in a paper on the teaching of domestic science, laid it down that the object of their instruction should be the formation of habits, not the accumulation of knowledge. Elementary work, in what Prof. Armstrong prefers to call *vous* or "knowingness" rather than science, should throughout aim at developing and strengthening a young pupil's mother wit. Anything may be taught and in any way, provided it leads to the cultivation of *vous*. All teaching in domestic science must be guided by considerations of this kind, and the fundamental subjects of a suitable course will be measuring work, which will not be unduly prolonged, but give place at an early stage to continued exercises with the balance; the study of the

properties of water will follow, after which the effects of heat can with advantage be taken up, and so prepare the way for the final stage of the preliminary course—namely, the study of the air, more particularly in relation to the part it plays in the combustion of food and fuel. But throughout the course constant work with the balance must take a prominent part. The balance inculcates thrift and morality generally, and weighing should be so constantly resorted to that it becomes an absolute habit. If Rudyard Kipling could but be persuaded to write a song with the refrain "Weigh, weigh, weigh," which could be hummed by girls during their lessons in practical work in science, as well as sung on State occasions, he would be doing education a great service.

Prof. Tilden, F.R.S., opened a discussion and referred to the neglect of book-keeping in household management, and directed attention to the fact that a sound education must take notice of other subjects than science.

PSYCHOLOGY AND SCIENCE TEACHING.

Sir Henry Roscoe, F.R.S., took the chair at the concluding meeting, at which Prof. Earl Barnes gave an address on nature teaching for young children, and Principal Lloyd Morgan, F.R.S., lectured on psychology and science teaching. Prof. Morgan said a lecturer in psychology had been defined thus by a pupil—"He tells us what every one knows in language which nobody can understand," but he hoped to avoid the dangers mentioned in the definition. It is easier to indicate what is not education than to give a satisfactory account of what it is: "when one fellow talks about what he doesn't understand to other fellows who don't understand him, that's *not* education." The teacher ignorant of psychology is somewhat of a quack, the honest and earnest instructor must have some practical knowledge of mental processes. In fact, all science teachers ought to take a course in psychology as part of their recognised curriculum in training for their life-work. But such work in psychology should have an experimental basis; the professor and his students must participate in an investigation together. Prof. Morgan then described, with a series of practical demonstrations, the research he was assisting his own students to carry out. In all such practical work it is borne in mind that the first stage in a normal course of mental sequence is that of observation presenting facts which demand explanation; the second that of discovery; and the third that of testing and applying the principles. A discussion followed in which the chairman and Dr. Gladstone took part.

A collection of home-made apparatus for science teaching in schools was on view during the days of the conference, and the chemical, physical and mechanical laboratories of the Polytechnic were open for inspection. A. T. SIMMONS.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Sedgwick prize in geology has been awarded to Mr. F. R. C. Reed, M.A., of Trinity College.

At Peterhouse the following entrance scholarships in Natural Science have been awarded: Blackie, Tonbridge School, 50*l.*; King, City of London School, 40*l.*

THE University of Cincinnati was re-organised in the latter part of last year, and an account of the changes, with photographs and short biographical sketches of the Faculty as now constituted, is given in *Chic.* The most distinctive change is the introduction of the elective system, which permits the student to follow the course of study which best suits his needs for the profession or business he intends to follow after leaving the University. A college of commerce and administration is in contemplation, which will have for its object practical instruction in methods of business in conformity with modern demands. The endowment fund of the University, through the bequests of a number of generous benefactors, amounts to the substantial sum of 3,357,308 dollars, or more than 700,000*l.* The president of the University is Dr. H. Ayres, formerly professor of biology in the University of Missouri.

Literature remarks.—The close of the term for the Christmas vacation has shown the interest of the American millionaire in the advancement of learning. Mr. J. D. Rockefeller gives 300,000*l.* to the University of Chicago and 3000*l.* to the Vermont Academy. Wellesley College, Mass., receives 20,000*l.*

from various donors, and Ripon College, Wisconsin, comes into possession of a handsome building for scientific study, the gift of Mr. O. H. Ingram. The Universities have, on the whole, done well by the millionaires. Here is a summary of the largest endowments and their givers:—

Chicago University	...	J. D. Rockefeller	...	\$9,133,874	...	£1,902,848
Gerard College	...	Stephen Gerard	...	7,000,000	...	1,458,333
Pratt Institute	...	Charles Pratt	...	3,600,000	...	750,000
Johns Hopkins Univ.	...	Johns Hopkins	...	3,000,000	...	625,000
Drexel Institute	...	A. J. Drexel	...	3,000,000	...	625,000
L. Stanford University	...	Leland Stanford, jun.	...	2,500,000	...	520,833
Cornell University	...	Ezra Cornell	...	1,500,000	...	312,500
Vanderbilt University	...	The Vanderbilts	...	1,100,000	...	229,166
Columbia University	...	Seth Low	...	1,000,000	...	208,333

But there are millionaires outside of America, and the list may at any rate be taken as an example *pour encourager les autres*.

SCIENTIFIC SERIALS.

American Journal of Science, January.—The stereographic projection and its possibilities, from a graphical standpoint, by S. L. Penfield. Two stereographic protractors devised by the author are described, and detailed instructions given for their use. These protractors are especially adapted to crystallographic problems, but this branch of the subject is postponed for special consideration in a further communication.—On the mode of occurrence of topaz near Ouro Preto, Brazil, by Orville A. Derby. The yellow Brazilian topaz of the Ouro Preto district was stated by Eschwege to occur in association with talcose or chlorite schist, and this was confirmed to some extent by Mawe, Spix and Martius. This view was contested by Gorceix, who found that the unctuous schists of this region are essentially micaceous. The results of the author's researches in this district show that the occurrence of the topaz here does not differ so materially from the other known ones as has hitherto been supposed. The mineral does not occur in an essentially magnesian rock, nor is its matrix of presumably sedimentary rather than of eruptive origin.—A chemical study of the glaucophane schists, by Henry S. Washington. Analyses of glaucophanes from Syria, Oregon, Croatia, Anglesey, California, Japan and Piedmont, sixteen analyses in all. The glaucophane schists are found to belong to two classes. The larger one is basic, and consists chiefly of glaucophane and epidote, and scarcely differs in chemical composition from the amphibolites and eclogites. A smaller, but widely spread group, is acid in composition, and these are composed largely of quartz and glaucophane.—On the nature of the metallic veins of the Farmington meteorite, by O. C. Farrington. The question of the origin of the metallic veins in a meteorite is of interest as throwing light on the origin, terrestrial or pre-terrestrial, of the meteorite. Preston's views on the veins in the Farmington meteorite are discussed and shown to be improbable.—*Ergenia bulbosa*, by Theo. Holm. An examination of the question as to whether the globular underground part of this plant is a true tuber or a tuberous root. After some trouble, specimens of the plant were obtained in the seedling stage, and the bulb was found to be a tuberous root.—New species of *Merycochoerus*, in Montana, by Earl Douglass. This species, described as *M. altiramus*, found in the Madison Lake beds of the Loup Fork epoch, is represented by a right mandibular ramus which only lacks the posterior border and some other small fragments. The paper is illustrated by five diagrams of the dentition, accompanied by careful measurements.

Bulletin of the American Mathematical Society, December, 1900.—Prof. F. N. Cole gives an account of, with abstracts of the papers read at, the October meeting of the Society. As these papers will be printed *in extenso* in the *Bulletin*, or in the *Transactions*, we omit the consideration of them here. Prof. M. Böcher devotes a page to a note on linear dependence of functions of one variable. Report on the groups of an infinite order, by Dr. G. A. Miller, was read before Section A of the American Society for the Advancement of Science, which met at New York in June last. This is a useful *résumé* of recent work done upon the theory of groups, with copious references to original memoirs. Two reviews follow, viz., of Ewing's "The Strength of Materials," by Dr. C. Chree, and of the "Anwendung der Differential- und Integralrechnung auf Geometrie" of Dr. G. Scheffers (Bd. i. "Einführung in die Theorie der Curven in der Ebene und im Raum"), by Prof. J. M. Page. Notes and new publications close the number.